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Experimental study of viscoplastic avalanches striking a water body using PIV techniques

Zhenzhu Meng and Christophe Ancey
EPFL-ENAC-LHE, Lausanne, Switzerland (zhenzhu.meng@epfl.ch)

A recurrent problem in avalanche engineering is related to impulse waves induced by snow avalanches striking a water basin. We took a first step toward the avalanche dynamics when falling into water by using a viscoplastic material that mimics avalanches. The objective was to understand how momentum is transferred from the viscoplastic material to the water body.

A series of experiments were conducted using PIV techniques and transparent materials (water and Carbopol). To that end, we proceeded images taken at high frequency. We tracked fluorescent seeds in the viscoplastic material and water illuminated by a laser, which made it possible to visualize the velocity field inside the materials. The images obtained were also used to track the progression of the interface between the viscoplastic material and the water body.

Our experiments provided preliminary insights into the interaction between the two materials. In particular, momentum evolution of the two phases was analyzed. In addition, how the viscoplastic material deformed after entering the water body was considered.